INVENTORY OF FOREST RESEARCH IN NOVA SCOTIA 1983-1984

Nova Scotia

Department of
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INVENTORY OF FOREST RESEARCH

IN NOVA SCOTIA 1983-84

Compiled by

The Forest Research Section

Reforestation and Silviculture Division

N.S. Dept. of Lands & Forests

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INTRODUCTION

This report documents the forest research activities of various agencies within the Province of Nova Scotia. Recently completed projects and on-going research plus proposed research are listed under general descriptive headings. The title and objective of each project or study are listed, along with project completion date and name(s) of individual directly responsibe for the work.

Further information on any of the activities listed in this report can be obtained by contacting the agency or individual responsible.

BIOMASS AND ENERGY

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	FUNDING AGENCY	PROJECT DIRECTOR
Biomass for energy and site productivity	To determine the effects of energy on the nutrient status and long-term productivity of selected forest sites in the Maritimes (4 year study)	1983	Institute for Resource and Environmental Studies, Dalhousie University	Environment Canada, Canadian Forestry Service	Dr. B. Freedman
Energy saving and production	To study energy savings and energy production in Nova Scotia bio-resource industries	1980	Institute for Resource and Environmental Studies, Dalhousie University	Energy, Mines, and Resources Canada	Dr. F. R. Hayes
Fuelwood	To develop marketing strategies for urban fuelwood use	1981	Institute for Resource and Environmental Studies, Dalhousie University	"	Dr. A. J. Hanson
Fuelwood	To establish a fuelwood monitoring program for Nova Scotia. Yr. 1	1982	Institute for Resource and Environmental Studies, Dalhousie University	"	Dr. A. J. Hanson
Fuelwood	To establish a fuelwood monitoring program for Nova Scotia. Yr. 2	1984	Institute for Resource and Environmental Studies, Dalhousie University	"	Dr. A. J. Hanson
Wood as an energy source	Increased use of wood as an energy source in Nova Scotia - Provincial Fuelwood Feasibility Study	1982	Institute for Resource and Environmental Studies, Dalhousie University	N.S. Dept. of Mines and Energy	Dr. A. J. Hanson
Fuelwood supply	Firewood supply business feasibility study	1982	Institute for Resource and Environmental Studies, Dalhousie University	Real Opportunities for Prisoner Employment through Underwood McLellan Ltd.	N. P. Blair

BIOMASS AND ENERGY (cont'd)

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Energy from forest biomass (ENFOR)	To determine the quantity, form and rate of growth of forest biomass in the Maritime region, and to ascertain the ecological, social, and economic effects of harvesting it for energy use.	1986	Canadian Forestry Service, Maritime Forest Research Centre		G.D. van Raalte M. F. Ker
Intensive culture of hybrid poplars	To examine the performance of selected hybrid poplar clones. To determine the extent of management inputs required to successfully grow hybrid poplars in Nova Scotia.	1987	N.S. Dept. Lands & Forests; Forest Research Section and Reforestation Section	R. Minard	P. D. Neily

CHRISTMAS TREES

PROJECT/STUDY	OJBECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Vegetative Propagation of balsam fir	Pilot study to assess the feasibility of using vegetative propagation as a tool for genetic improvement of balsam fir Christmas tree planting stock	1983	N.S. Dept. Lands & Forests - Tree Breeding Centre	H. M. Frame	T. J. Mullin
Genetic improvement of balsam fir Christmas trees	To develop an operational Christmas tree improvement program and to conduct research on the genetic parameters of balsam fir	1990	Canadian Forestry Service, Maritime Forest Research Centre		J. D. Simpson
Experimental Christmas tree farms	To encourage the development of a vigorous Christmas tree industry in the Maritime provinces through the establishment of a number of cooperatively-operated Christmas tree farms, on which to develop and demonstrate improved production techniques	1984	Canadian Forestry Service, Maritime Forest Research Centre		D. G. Embree
Christmas tree trials - shearing - fertilizing - plantation establishment - growth regulators - herbicides	To determine the cultural practices required to optimize quality and minimize production costs to help ensure the viability of this industry in Nova Scotia.	1986	N.S. Dept. Lands & Forests Forest Research Section	P. A. Romkey	R. E. Bailey R. D. McNally
Problems of balsam fir Christmas tree culture	To determine the optimal procedures for establishing plantations on old fields and to develop a method for predicting when trees can be harvested without risk of premature loss of needles.	1985	Canadian Forestry Service, Maritime Forest Research Centre		C.H.A. Little

ENVIRONMENTAL IMPACT STUDIES

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Effects of long-range transport of air pollutants on forest vegetation and soil in the Maritimes	To investigate selected aspects of acid precipitation (LRTAP) interactions with forest vegetation and soils	1985	Canadian Forestry Service, Maritime Forest Research Centre		K. Percy
Development of ecologically sound intensive forest management practices	To evaluate the ecological side effects of intensive forest management practices and develop suitable alternatives or modifications to those practices which are considered detrimental	Continuing	"		R. E. Wall
The effectiveness of riparian vegetation strips in ameloriating the effects in clearcutting	To determine the affects of various widths of riparian buffer-strips in ameliorating the effects of various forestry practices on streams	1983	"		H. van Groenewoud
Acid rain and nutrient cycling in the terrestrial ecosystems of the Maritimes	To determine baseline characteristics of selected terrestrial ecosystems in the Maritimes. To determine the affects of acid rain and other pollutants on selected key components of forest ecosystems, including microbial and chemical pathways and processes of the nutrient cycle, physiological and biochemical processes, and morphological and histochemical condition.	Continuing	"		M.K. Mahendrappa

ENVIRONMENTAL IMPACT STUDIES (cont'd)

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Interactions of acid rain and nitrogen transformation processes	To characterize nitrogen transformation processes in the forest ecosystems of the Maritimes region, and to determine their interactions with acid rain and other pollutants.	1986	Canadian Forestry Service, Maritime Forest Research Cenre		M.K. Mahendrappa
Interaction between acid rain and forest soil organic transformations	To access the influence of various pollutants and silvicultural treatments on the soil microflora, and to find manipulation principles by which the soil microflora may be influenced to increase the rate of nutrient circulation between forest soils and trees in both natural and managed forest.	1986	"		P. O. Salonius
Terrestrial effects of long-range transport of air pollutants in two catchments of Kejimukujik National Park	To investigate the effects of LRTAP on the forest vegetation and soils of the Maritimes through the monitoring of two selected catchments in Kijimkujik National Park.	1990	"		K. Percy
Effects of clearcutting on stream arthropods and nutrient cycling processes in which they are involved as indicators of changes in environmental quality.	To determine the consequences of forest clearcutting practices on aquatic invertebrate populations as indicators of environmental quality.	1986	"		D. C. Eidt

ENVIRONMENTAL IMPACT STUDIES (cont'd)

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Regrowth of understory species following treatments (burning, cutting, herbicides).	To understand better the use of each management tool. To study factors such as total nonstructural carbohydrate and soluble nitrogen in rhizomes of understory species. To relate the above plus soil pH, soil temperature, bud conditions and biomass after multiple treatments and the subsequent regrowth patterns. To determine the effect of multiple burning on understory species and their competitive nature. To evaluate the control of rhizome regeneration *in situ*	Continuing	Mount Saint Vincent University - Research Grant	Dr. M.A. Flinn Dr. I.E. Blum Prof. E.V. Martin	Dr. M. A. Flinn

FERTILIZATION

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Forest fertilization in Nova Scotia	To measure the growth response of various tree species of different ages to various rates and combinations of N, P, and K fertilizers, and to follow regeneration on cutover plots to assess the influence of past fertilizer additions upon the next rotation	1986	Canadian Forestry Service, Maritime Forest Research Centre		P. O. Salonius
Efficiency of nutrient amendments to forest soils	To determine the efficiency and long-term effects of a variety of nutrient sources and to elucidate the principles underlying their relative uptake by forest stands. To develop a realistic method of measuring response to fertilizer amendments	1988	"		P. O. Salonius
Fertilization	To evaluate the costs and benefits of applying various types and rates of fertilizer to natural (managed) and planted stands	Continuing	N.S. Dept. Lands & Forests, Forest Research Section	C. Sullivan	R. D. McNally R. E. Bailey

FISHERIES AND WILDLIFE

PROJECT/STUDY	OBJECITVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Forest management and breeding birds	Effects of forest management practices on populations of breeding birds	1982	Institute for Resource and Environmental Studies, Dalhousie Studies*		Dr. B. Freedman
Stream trout population studies	To determine baseline population levels and factors affecting those populations	Continuing	N.S. Dept. Lands & Forests, Wildlife Division		C. B. Sabean
Creel census of sport fish	To obtain data on catch rates, growth and health of specific populations of fish	Continuing	"		C. B. Sabean
Habitat inventory	To gather, physical, chemical and biological information on lake and stream fish habitats	On-Going	"		C. B. Sabean
Wetland Management Studies	To investigate the feasibility of establishing willows as a wildlife food source and wind break on the Missiquash Marsh and dykes To evaluate the characteristics of outstanding productive wetland habitats	1988	"		F. J. Payne
Raptor Investigation and Management	To provide information on nesting, foraging and wintering habitats of birds of prey for use in management programs	On-Going	"		P.J. Austin-Smith

* Funded by Environment Canada, Canadian Wildlife Service

FISHERIES AND WILDLIFE (cont'd)

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Forest-Wildlife Habitat Inventory	To provide information on forest-wildlife habitats for use in assessing wildlife population trends	On-Going	N.S. Dept. Lands & Forests, Wildlife Division and Forest Inventory Section		P.J. Austin-Smith A. E. Patton M. Stewart F. Wellings (Inventory)
Moose Population Analysis	To detemine age, condition and reproduction of moose from sampling of natural mortality	Continuing	N.S. Dept. Lands & Forests, Wildlife Division		A. E. Patton
Game Depredation Study	To determine extent, distribution, contributing factors, control and perpetrator of agricultural depredations by wildlife	Continuing	N.S. Dept. Lands & Forests, Wildlife Division and N.S. Dept. Agric. & Marketing		A. E. Patton F.N. VanNostrand P.J. Austin-Smith R. Whitman (A&M) S. Allabeg (A&M)
Deer Reproduction Study	To determine reproductive rates of deer and changes over time	Continuing	N.S. Dept. Lands & Forests, Wildlife Division		A. E. Patton
Deer Condition Analysis	To evaluate physical condition of deer	Continuing	"		A. E. Patton
Deer Pellet Group Inventory	To determine deer population fluctuations	Continuing	"		A. E. Patton
Deer & Moose Winter Yard Inventory	To identify and evaluate key winter habitats for deer and moose	Continuing	"		A. E. Patton
Deer Harvest Analysis	To determine hunter effort and deer harvest in each county	Continuing	"		A. E. Patton

FISHERIES AND WILDLIFE (cont'd)

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Deer Ageing Project	To determine age distribution of deer from hunter harvest sampling	Continuing	N.S. Dept. Lands & Forests, Wildlife Division		A. E. Patton
Bear Harvest Analysis	To determine hunter and snarer activity and harvest of bears	Continuing	"		A. E. Patton
Bobcat fat and scat study	To assess condition and predict trends in cat populations	1984	Acadia University, Dept. of Biology*	C. Matlack	F.N. VanNostrand
Bobcat reproduction and age analysis	To evaluate reproductive and harvest performance	1984	N.S. Dept. Lands & Forests, Wildlife Division	A. Evans	F.N. VanNostrand
Bobcat Telemetry in Tobeatic Management Area	To study the movement patterns of radio collared bobcats	1984	"	A. Evans	F.N. VanNostrand
Coyote biological evaluation	To provide baseline biological information with which to assess rapidly increasing populations	Continuing	"	D. MacNearney	F.N. VanNostrand J. Mills
Fisher age and reproductive study	To compare trends for management purposes	Continuing	"	J. Mills	F.N. VanNostrand

* Sponsored by the N.S. Dept. Lands & Forests, Wildlife Division

FOREST MANAGEMENT

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Forestry Services: federal lands	To manage and protect the forests on DND and CFS land in the Maritime Region on a sustained yield basis so that this valuable resource is not wasted.	Continuing	Canadian Forestry Service, Maritime Forest Research Centre		C.B. Rayworth
Advisory services to the forestry sector: General silviculture, with particular reference to small woodlots	To provide scientific and technical information, advice, and other services to forest managers in particular with relation to small woodlots in the region.	Continuing	"		K. G. Moar
Acadia Forest Experiment Station	To provide field, greenhouse, and nursery research facilities to MFRC staff. To demonstrate land management techniques for the commercial forest on the area not utilized for research purposes	Continuing	"		H. Munn
Forest Management on other DND properties	To harvest the annual forest growth of DND lands, where possible increase forest productivity, and to keep forest fire damage to a minimum.	Continuing	"		C.B. Rayworth
Operational Research	To provide quick solutions to immediate problems arising in forest operations.	Continuing	"		D. G. Embree

FOREST MANAGEMENT (cont'd)

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Operational research: utilization	To determine the wood quality of dead and dying balsam fir in the Cape Breton Highlands area of Nova Scotia	Continuing	Canadian Forestry Service, Maritime Forest Research Centre		J.H. Johnston
Advisory services to the forestry sector of the Maritime provinces: Utilization, general silviculture, and small private woodlots	To provide, as well as coordinate, technical information with provincial agencies on harvesting practices, utilization of specific woodlot products, marketing and silvicultural treatments, particularly to small woodlot owners in the Maritime provinces, and especially those being assisted by the Forest Resource Development Agreements.	Continuing	"		J.H. Johnston K.G. Moar
Advisory services to the forestry sector: Technology transfer liaison N.S. and P.E.I.	To provide the forestry sector of P.E.I. and N.S. with immediate advice on forestry problems. To act as liaison between the forestry sector and MFRC researchers and forestry officers in defining or solving difficult problems. To provide forestry expertise at the project team level in the administration, development, and implementation of forestry projects which are financed by federal/provincial agreements.	Continuing	"		Vacant

FOREST MANAGEMENT (cont'd)

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Advisory services to the forestry sector: Utilization	On the basis of existing information, or by modifying or devising new techniques, to advise the forestry sector on optimum harvest, storage and utilization practices for specific products including presently under-utilized species and the potential for new manufacturing or modification of standard processes relating to the forest resource.	Continuing	Canadian Forestry Service, Maritime Forest Research Centre		J. H. Johnston
Effect of woodlot management on small mammals and songbirds	To determine the effect of past woodlot management prescriptions on populations of small mammals and songbirds and their [illegible]	1982	Acadia University and N.S. Dept. of Lands & Forests		J. Orr, T. Herman (Acadia) D. Harris (NSLF)

FOREST NURSERY

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Ectomycorrhizal inoculum	To isolate suitable mycorrhizal fungi and to develop methods for culturing these fungi and for inoculating seedlings	1986	Nova Scotia Research Foundation Corporation, Biology Division	C. D. Boyle	K. Hellenbrand
Seedbed density	To determine 1+0 seedbed densities where frost heaving losses are minimal while still maintaining quality stock	1984	N.S. Dept. Lands & Forests, Forest Research Section		P. D. Neily
Soil moisture monitoring	To construct soil moisture curves for each nursery to enable nursery personnel to make the best use of irrigation water when growing field crops	Continuing	N.S. Dept. Lands & Forests, Forest Research Section, Reforestation Section, Tree Breeding Centre	R. Minard B. F. White T. J. Mullin	P. D. Neily
Vegetation propagation of black spruce	To refine techniques for the vegetative propagation of black spruce seedlings for juevenile cuttings. Trials include experimentation with cutting length and diameter, age of cutting, fungicides, growth hormones and fertilizers, and locale of cutting	1983	N.S. Dept. Lands & Forests, Forest Research Section and Reforestation Section	N.G. Manwaring	P. D. Neily B.F. White
Advisory services to the forestry sector: Nurseries	To assist reforestation managers in the development of reforestation activities, particularly nurseries	Continuing	Canadian Forestry Service, Maritime Forest Research Centre		R. D. Hallett

FOREST NURSERY (cont'd)

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Development of seedlings culture systems	To develop greenhouse and nursery seedling production systems that effectively integrate available cultural techniques	1987	Canadian Forestry Service, Maritime Forest Research Centre		S. I. Cameron R. D. Hallett
The physiology of seedling growth	To study two key growth processes in tree seedlings, and to develop models for determining which parameters can be manipulated for practical silvicultural gain	1989	Canadian Forestry Service, Maritime Forest Research Centre		S. I. Cameron
Nursery cost accounting	To develop a computer assisted accounting system for a forest nursery. This would enable seedling costs to be determined based on species and age class and to isolate each production cost.	1983	N.S. Land Survey Institute and N.S. Dept. Lands & Forests, Reforestation Section	Dr. R. V. Maher (NSLSI)	D. M. Levy (NSLF)

GROWTH/DEVELOPMENT AND YIELD

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Growth substances and cambial activity	To increase understanding of the physiology of wood formation in trees by determining the role of growth substances in controlling cambial activity	Continuing	Canadian Forestry Service, Maritime Forest Research Centre		C. H. A. Little
Carbohydrate relations and tree growth	To increase understanding of the internal mechanisms controlling carbohydrate supply and distribution	Continuing	"		C. H. A. Little
Development of mathematical models of tree and stand growth	To develop mathematical models of tree and stand growth for balsam fir	Continuing	"		M. F. Ker
Tree and stand growth modelling	To determine and elucidate key processes, controls, and patterns of tree and stand growth and to develop models of forest growth and productivity based on these data	Continuing	"		C. H. A. Little
A multi-region model of rotation incorporating an industry structure	To develop a model to calculate an optimal rotation period for forest growth. The model distinguishes regions by (a) geographical location, (b) ownership, and (c) cover type. The model incorporates the wood-using industry so that a forest management policy developed using this model will be compatible with the requirements of the industry.	1984	Technical University of Nova Scotia, Dept. of Industrial Engineering*	Dr. E.A. Gunn A. Rai	Dr. E.A. Gunn

* Sponsored by the Natural Sciences and Engineering Research Council of Canada

INSECTS AND DISEASES

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
A survey of spruce budworm defoliation and recovery	To determine volumes of mortality, rate of decay of existing stands, volumes of wood for each defoliation class, comparison of B.t. spray vs non-spray, and volume by recovery class	Continuing	Scott Paper International		B. B. Yuill
Impact of SBW on forest succession	To determine the impact of SBW damage on regeneration and successional trends under a variety of managed and unmanaged forest conditions	1992	Canadian Forestry Service, Maritime Forest Research Centre		M. Huot
Impact of SBW populations on tree and stand growth	To determine the influence of SBW defoliation on host tree growth, nutrition, and volume production. To determine rates of tree mortality in severely defoliated stands, and their relation to individual tree and stand characteristics	1985	Canadian Forestry Service, Maritime Forest Research Centre		H. Piene D. A. MacLean
Development of strategies to minimize losses to spruce budworm	To develop knowledge and techniques necessary for the formulation of more effective control tactics, management strategies and policy alternatives to cope with the forest resource/budworm problems in the Maritimes	Continuing	Canadian Forestry Service, Maritime Forest Research Centre		I. W. Varty

INSECTS AND DISEASES (cont'd)

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Response of spruce budworm to physical factors	To determine the effects of physical factors on the survival of the SBW	1985	Canadian Forestry Service, Maritime Forest Research Centre		A. W. Thomas
Control of tree diseases and other pest problems using microorganisms and their metabolites	To evaluate and exploit biological control methods involving metabolities of living organisms for combating tree diseases and other pest problems	1989	"		G. M. Strunz R. E. Wall
Elucidation of processes involved in maintaining budworm populations at endemic levels	To establish methods of data interpretation and designs of field and laboratory studies for developing workable strategies for the effective maintenance of endemic budworm populations	1985	"		T. Royama
Natural products affecting SBW behaviour	To investigate the chemical basis of host selection for oviposition and feeding by the SBW	1984	"		G. M. Strunz
A search for inhibitors of juvenile hormone biosynthesis in *Choristoneura fumiferana*	To discover chemical compounds which inhibit one or more of the (enzymecatalyzed) steps in the biosynthesis of JH, in the SWB	1983	"		C. M. Strunz
Larval feeding rates on major host species	To determine the amount of new and old foliage destroyed by a budworm larva on each of the four major host species	1983	"		A. W. Thomas

INSECTS AND DISEASES (cont'd)

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Spruce budworm core modelling group, MFRC; systems aspects	To develop methodologies for doing systems research, and to apply them to SBW related problems	Continuing	Canadian Forestry Service, Maritime Forest Research Centre		W. R. Cuff R. A. Fisher
Pathology and ecology of weed species	To determine the effects on regeneration of non-commercial species and the role of disease in limiting these effects	1985	"		R. E. Wall
Mortality of yellow birch and other commercial species in young stands	To determine the cause of mortality in young yellow birch stands				
Ecological studies on the population dynamics of the SBW	To improve understanding of SBW population dynamics through detailed ecological studies on the major components of budworm dynamics	1987	"		E. S. Eveleigh T. Royama
Comparison and evaluation of models relating to aspects of SBW and/or forest systems	To compare and evaluate the existing SBW-forest models as they relate to the Maritime provinces	1982	"		W. R. Cuff R. A. Fisher
The appriasal of damage caused by forest insects and diseases	To develop, test, and apply techniques for assessment and quantification of damage caused by forest insects and diseases. To determine the relationships between insect abundance, defoliation, tree mortality and growth loss under a range of stand conditions and SBW history.	Continuing	"		D. P. Ostaff

INSECTS AND DISEASES (cont'd)

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Identification, date processing and analysis of forest insects and diseases	To identify forest insects and diseases, particularly those which may not be native species, develop and maintain associated collections and records, provide appropriate material and records to researchers, and to analyze current and non-current information on pest conditions	Continuing	Canadian Forestry Service, Maritime Forest Research Centre		L. P. Magasi
Forest insect and disease conditions and their effect on the forests of the Maritimes	To determine and report on the status of forest insects and diseases and the damage caused by them in the Maritimes. To develop, test, and apply new techniques for the acquisition of such information.	Continuing	"		B. A. Pendrel
Forest insect and disease survey	To determine and report on the status or presence of native and introduced forest insects and diseases and the damage caused by them so as to provide national statistics on the forests of Canada, special information and assistance as required by the CFS, and to forecast potential pest problems in the forests of the Maritime region	Continuing	"		L. P. Magasi

INSECTS AND DISEASES (cont'd)

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Detection and assessment methodolgoy for forest insects and diseases	To develop, test, and apply technqiues for detecting forest insects and diseases and assessing their damage and to advise industrial, governmental, and private individuals accordingly	1982	Canadian Forestry Service, Maritime Forest Research Centre		B. A. Pendrel
Advisory services to the forestry sector: Protection	To provide the technical information needed by forest owners and managers, and provincial and municipal agencies to reduce the impact of pest organisms on the Maritime forest	Continuing	"		T. R. Renault
Special surveys and studies related to control operations against the spruce budworm in the Maritime provinces	To define the nature and extent of infestations, damage, and hazard to trees posed by the SBW on a year-to-year basis. To evaluate the efficacy of control operations in terms of protection of foliage and mortality of insects and to advise on control procedures. To evaluate operational trials with new insecticides and related chemical compounds and formulations	Continuing	"		E. G. Kettela

INSECTS AND DISEASES (cont'd)

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Advisory services to the forestry sector: Pest control	To provide the forestry sector with advice and technical services on pest control operations, and to provide advice and/or supervision on major pest surveys related to control operations	Continuing	Canadian Forestry Service, Maritime Forest Research Centre		E. G. Kettela

MECHANICAL EQUIPMENT

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Site preparation with the Brush Rake	To determine the effectiveness of the Brush Rake and to explore modification	1983	Scott Paper International		B. B. Yuill
Site preparation on silt loams	To experiment with standard site preparation equipment on troublesome sites - silt loams - which create frost heaving problems for planted seedlings	Continuing	Scott Paper International		B. B. Yuill
Corridor spacing with the Hydro-Ax	To reduce stand density a Hydro-Ax 500 model was used to mow 8-9 foot strips with 12-18 foot leave strips in young softwood stands scheduled for spacing	1983	Nova Scotia Forest Industries		H. F. Ross

PESTICIDES - HERBICIDES

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Ground application of herbicide	To examine the effectiveness of ground applied herbicide with the boomless tee-jet nozzle	1983	Scott Paper International		B. B. Yuill
Environmental impact of aerial spraying on stability of arthropod populations in the fir-spruce-birch forest	To develop method of measuring insecticidal perturbation of the arthropod communities in target forest stands, and to determine ecological effects of aerial spray operations	1985	Canadian Forestry Service, Maritime Forest Research Centre		I. W. Varty
Efficacy of control agents applied aerially for operational control of SBW: Investigation on toxicological parameters for effective foliage protection	To elucidate mode of entry into and action of insecticides in SBW larvae and their micro-habitat after operational or simulated aerial applications, and to determine significance in foliage protection	1987	"		P. C. Nigam
Aerial spray efficacy against SBW: an investigation of the relationship between spray cloud behavior and toxic pathways to the pest	To provide information on the nature of the target, on the deposition of droplets and on larval behavior conducive to vulnerability to spray	1986	"		I. W. Varty
Impact of forest spraying on non-target organisms	To determine and evaluate the impact of forest spraying on non-target organisms, particularly arthropods, for use in planning SBW control strategy.	1987	"		D. C. Eidt

PESTICIDES - HERBICIDES (cont'd)

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Herbicide Trials	To evaluate the effectiveness of various types and levels of application of herbicides used for conifer release and site preparation. To examine time of application and tolerance to herbicides of crop species.	Continuing	N.S. Dept. Lands & Forests, Forest Research Section	P. Romkey	R. D. McNally R. E. Bailey
Herbicide application experiment	To evaluate the effectiveness of various types of application equipment	1985	"	P. Romkey C. Sullivan	R. D. McNally R. E. Bailey

REFORESTATION

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Plantation survival and growth	To establish and remeasure sample plots to determine survival and growth of containerized seedlings in operational plantings	Continuing	Bowater-Mersey Paper Co.	M. B. Barkhouse	E. F. Bulley
Plantation establishment and early growth performance in the Maritimes	To determine the planting techniques and systems and post planting cultural activities most suitable for use on the major productive sites in the Maritimes.	1991	Canadian Forestry Service, Maritime Forest Research Centre		R. West
Forest Renewal Research	To develop, test, and evaluate greenhouse, nursery, planting, and post-planting cultural techniques suitable for use in the Maritimes. To develop an ecological forest site classification system that integrates relevant data on tree growth, stand structure and compositon, and the site factors that affect these parameters, for use in reforestation and related activities in the region.	Continuing	"		Vacant
Advisory services to the forestry sector: reforestation	To provide the forestry sector with technical services in the field of reforestation based on research surveys, short-term trials or investigations through formal reports, direct field assistance, personal contact, seminars, lectures, workshops, and demonstrations.	Continuing	"		T. S. Murray R. D. Hallett

REFORESTATION (cont'd)

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Advisory services to the forestry sector: Plantations	To provide the forestry sector with immediate advice on problems or techniques related to reforestation, and to foster liaison with all agencies involved in reforestation	Continuing	Canadian Forestry Service, Maritime Forest Research Centre		T. S. Murray
Utilization of micro-organisms to alter plantation nutrient dynamics	To assess the long term influence of nutrient release of site preparation method which both expose mineral soil and bury a large proportion of the surface organic matter at depths whose temperature will decrease the intensity of the post-harvest decomposition flush. To work toward an operationally feasible method of producing seedlings associated with mycorrhizal fungus, which will enhance their early growth and survival. To investigate the effect of modifying the nitrogen status of forest plantations through the interplanting of nitrogen fixing alder with coniferous species.	1992	"		P. O. Salonius
Seed quality of production seedlots	To monitor the physical quality and viability of seedlots in storage for nursery production	Continuing	N.S. Dept. Lands & Forests, Tree Breeding Centre	E. D. Misener	T. J. Mullin H. M. Frame

REFORESTATION (cont'd)

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Germination of Nova Scotia White Spruce	To determine causes of low germination results reported for white spruce collected in Nova Scotia	1984	N.S. Dept. Lands & Forests Tree Breeding Centre and Canadian Forestry Service, Petawawa National Forestry Institute		H.M. Frame (NS) B.S.P.Wang (CFS)
Direct seeding trials	To test seeding techniques - broadcast, spot, and shelter cup, with various species and to evaluate the results as they apply to artificial regeneration in Nova Scotia	1980	N.S. Dept. Lands & Forests, Forest Research Section	P. Romkey	R. D. McNally R. E. Bailey
Plantation browsing trials	To determine browsing selectivity and severity in relation to species, stock type and age, and to test the effectiveness of rodent repellents	1981	N.S. Dept. Lands & Forests, Forest Research Section	P. Romkey	R. E. Bailey R. D. McNally
Seasonal planting experiments	To determine the acceptable planting season for a variety of species, stock types, and stock sizes	1984	N.S. Dept. Lands & Forests, Forest Research Section		R. D. McNally C. D. Sullivan R. E. Bailey
Species suitability to site	To determine the growth performance of various species, stock types and ages in relation to site To determine the benefits of fertilizing seedlings at time of planting.	Continuing	N.S. Dept. Lands & Forests, Forest Research Section		R. D. McNally R. E. Bailey

REFORESTATION (cont'd)

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Species suitability to site preparation	To examine the growth and survival performance of various species, stock types and ages on a range of sites prepared for planting by a variety of mechanical equipment.	Continuing	N.S. Dept. Lands & Forests, Forest Research Section	C. D. Sullivan	R. D. McNally R. E. Bailey
Planting tool trials	To evaluate the effect of various planting tools on seedling growth and survival.	Continuing	"		R. D. McNally R. E. Bailey
Forestry plantation depredation study	To determine chief factors affecting depredation in order to predict and minimize damage to risk prior to planting date	1986	N.S. Dept. Lands & Forests, Wildlife Division	K. Gaul J. Mills	F.N. VanNostrand
Browsing damage assessment	To develop a 'browsing hazard index' for reforested areas	Continuing	Acadia University Dept. of Biology		D. G. Dodds

STAND TENDING

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Hand weeding trials, Cumberland County	To determine the effectiveness and cost of hand weeding	Continuing	Scott Paper International		B.B. Yuill
Cleaning - growth and yield PSPs	To establish and remeasure PSPs (control and treatment) in cleaning areas	Continuing	Bowater-Mersey Paper Co.	M. B. Barkhouse	E. F. Bulley
Intensive forest management Problems and opportunities	To develop silvicultural prescriptions for the intensive management of the region's forest resource	Continuing	Canadian Forestry Service, Maritime Forest Research Centre		G.D. van Raalte
Effects of spacing and fertilization on productivity in managed stands	To obtain productivity data from spacing and fertilizing trials, for various sites and species, for use in prescribing optimum stocking levels and silvicultural treatments	1990	"		G.D. van Raalte
Effects of silvicultural practices on subsequent wood deterioration	To evaluate the effects of silvicultural practices, such as thinning and fertilization, on subsequent deterioration of standing timber or wood products	1985	"		R. E. Wall
Organic matter decomposition and nutrient turnover in stands of different densities	To determine the effects of stand density on nutrient availability and growth in managed and unmanaged stands that may be used as a base for silvicultural prescriptions	1985	"		H. Piene

STAND TENDING (cont'd)

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Spacing trials; - plantations - cleanings - commercial thinnings	To determine optimum spacing regimes for various management objectives To provide data necessary for the construction of equations needed for the development and refinement of growth and yield simulation models. To develop field prescriptions for both hardwood and softwood.	Continuing	N.S. Dept. Lands & Forests, Forest Research Section	C. Sullivan G. Keddy E. Robeson	R. D. McNally R. E. Bailey
Pre-merchantable thinning trials	To further evaluate the costs and benefits of this cutting technique	1985	"	G. Keddy	R. D. McNally R. E. Bailey
Shelterwood cutting	To determine optimum basal area removal and extraction methods needed to adequately regenerate both softwood and hardwood stands	1993	"	G. Keddy C. Sullivan	R. D. McNally R. E. Bailey
Natural regeneration after harvesting	To pre-determine stocking levels associated with various types and methods of harvesting	1985	"	C. Sullivan	R. D. McNally R. E. Bailey
Management of hardwoods	To develop methods and management systems for improving the growth, utilization, and value of the hardwoods resource in the Maritimes	Continuing	Canadian Forestry Service, Maritime Forest Research Centre		J. C. Lees

STAND TENDING (cont'd)

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Advisory services in hardwood silviculture	To provide technical advice and assistance on hardwood silvicultural management to forestry agencies in the region	1986	Canadian Forestry Service, Maritime Forest Research Centre		J. C. Lees
Development of silvicultural prescriptions for Maritime hardwoods	To develop silvicultural prescriptions for hardwoods which will fulfill a range of management objectives	1987	"		J. C. Lees
The role of hardwood stump sprouts in reforestation of cutover lands	To determine the occurrence, development, and fate of hardwood sprouts following cutting	1987	"		J. C. Lees

TREE IMPROVEMENT

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
White Spruce Progeny Test PT 78/1	To investigate within stand variation in Nova Scotia white spruce and the effectiveness of mass selection	Continuing	N.S. Dept. Lands & Forests, Tree Breeding Centre *		T. J. Mullin
Red Spruce Progeny Test PT 78/2	To investigate within stand variation in Nova Scotia red spruce and the effectiveness of mass selection	Continuing	N.S. Dept. Lands & Forests, Tree Breeding Centre *		T. J. Mullin
White Spruce Stand Test PT 78/3	To investigate among stand variation in Nova Scotia white spruce	Continuing	N.S. Dept. Lands & Forests, Tree Breeding Centre *		T. J. Mullin
Rangewide White Spruce Test PT 81/1	To investigate growth differences among sources of white spruce on a variety of Maritime sites	Continuing	N.S. Dept. Lands & Forests, Tree Breeding Centre * and Canadian Forestry Service, Petawawa National Forestry Institute		T.J. Mullin (NS) G. Murray (CFS)
Rangewide Tamarack Test PT 84/1	To investigate growth differences among sources of tamarack on a variety of Maritime sites	Continuing	Canadian Forestry Service, Maritime Forest Research and N.S. Tree Improvement Working Group		Y.S. Park (CFS) T.J. Mullin (NS)
Family Tests for Seedling Seed Orchards	A series of plantings to determine the genetic value of selected black spruce and white spruce families	Continuing	N.S. Dept. Lands & Forests, Tree Breeding Centre *		T. J. Mullin H. M. Frame
GE interactions in Black Spruce	To investigate the nature of genotype-environment interactions in black spruce and its effect on breeding strategy	Continuing	N.S. Dept. Lands & Forests, Tree Breeding Centre *		T. J. Mullin

* With funding from the Nova Scotia Tree Improvement Working Group

TREE IMPROVEMENT (cont'd)

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Tree improvement	To determine the amount of genetic improvement attainable within promising genera, to develop appropriate breeding strategies, and to provide resource managers of the region with information and breeding materials required to attain realistic genetic improvement in materials used in reforestation To develop, evaluate, and promote efficient techniques of producing genetically superior seedlings.	Continuing	Canadian Forestry Service, Maritime Forest Research Centre		D. P. Fowler
Hybridization in Picea and Larix	To produce, test and develop methods of mass-producing hybrids of Picea and Larix that may be of value in the region	1987	"		D. P. Fowler
Tissue culture of forest tree species	To develop homozygous lines of conifer species for hybridization purposes, using tissue culture techniques. To develop tissue culture techniques for large-scale vegetative propogation of selected specimens of coniferous species	Continuing	"		J. M. Bonga

TREE IMPROVEMENT (cont'd)

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Selection of species and provenances for use in the Maritimes	To improve forest production in the Maritimes by determining the best adopted and production species and their best provenances within these species for use in various location in the region.	Continuing	Canadian Forestry Service, Maritime Forest Research Centre		D. P. Fowler Y. S. Park
Development of tree improvement strategies in the context of forest resource management in the Maritimes	To assist provincial and industrial agencies in the development of operational tree improvement programs through the provision of advice and consultation and the conduct of special research investigations.	Continuing	"		J. F. Coles J. D. Simpson R. F. Smith
Population studies of important tree species in the Maritimes	To elucidate the genetic structure of populations of tree species used in reforestation in the Maritimes, to estimate and interpret genetic parameters of important growth and quality attributes, and to utilize this information to assist in the development of tree improvement strategies.	1989	"		Y. S. Park
Applied tree improvement problems	To provide solutions to applied tree improvment problems in the Maritimes through short-term research	1989	"		R. F. Smith

TREE IMPROVEMENT (cont'd)

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Wood quality of plus-trees	An investigation of wood quality parameters and variation for TIWG plus-trees	1984	University of New Brunswick, Faculty of Forestry *	T. J. Mullin	L.P. Sebastian (UNB)

* With sponsoring from the N.S. Tree Improvement Working Group (TWIG)

OTHER

PROJECT/STUDY	OBJECTIVE	COMPLETION DATE	PERSON/AGENCY	PROJECT LEADER	PROJECT DIRECTOR
Environmental impacts of forestry	Literature review of environmental impacts of forestry in Atlantic Canada	1982	Institute for Resource and Environmental Studies, Dalhousie University *		Dr. B. Freedman
Natural history of Nova Scotia	To describe Nova Scotia's natural history on a province-wide basis through reference to topics, habitats and regions	1984	N.S. Dept. Lands & Forests, Parks & Recreation Division and Nova Scotia Museum, Science Section		D. Smith (Parks) D. Davis (Museum)
Remote sensing using satellite imagery	To classify cutovers and new forest road construction in the province using Landsat DIC's computer tapes	. Continuing	N.S. Dept. Lands & Forests, Resource Planning & Mensuration Division	B. Barron W. Veres	K. Snow (NSLF)
Management unit analysis using the Geographic Information System (G.I.S.)	To analyse the forest covertype maps and the biophysical maps using the (G.I.S.) of the Environmental Systems Research Institute	1983	N.S. Land Survey Institute (NSFSI) and N.S. Dept. Lands & Forests, Resource Planning & Mensuration Division	J. Wightman (NSLSI)	K. Snow (NSLF)
A decompositon approach to a model of forest harvesting, wood allocation and transportation	To determine whether mathematical decomposition techniques can be applied to a linear programming model of forest harvesting, wood allocation and transportation	1984	Technical University of Nova Scotia, Dept. of Industrial Engineering**	Dr. E.A. Gunn M. Thorburn	Dr. E.A. Gunn

* Funded by Environment Canada, Environmental Protection Services

** Sponsored by the Natural Sciences and Engineering Research Council of Canada

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